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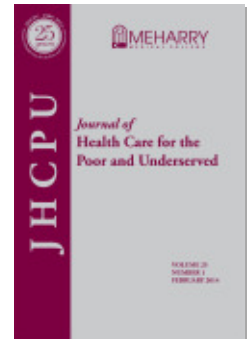
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## Cancer Control Needs of 2-1-1 Callers in Missouri, North Carolina, Texas, and Washington

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*Abstract:* Innovative interventions are needed to connect underserved populations to cancer control services. With data from Missouri, North Carolina, Texas, and Washington this study a) estimated the cancer control needs of callers to 2-1-1, an information and referral system used by underserved populations, b) compared rates of need with state and national data, and c) examined receptiveness to needed referrals. From October 2009 to March 2010 callers' (N=1,408) cancer control needs were assessed in six areas: breast, cervical, and colorectal cancer screening, HPV vaccination, smoking, and smoke-free homes using Behavioral Risk Factor Surveillance System (BRFSS) survey items. Standardized estimates were compared with state and national rates. Nearly 70% of the sample had at least one cancer control need. Needs were greater for 2-1-1 callers than for state and national rates, and callers were receptive to referrals. 2-1-1 could be a key partner in efforts to reduce cancer disparities.

*Key words:* Cancer control; cancer prevention; health disparities; underserved populations; social service systems.

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People who are poor, uninsured, and/or members of racial and ethnic minorities shoulder a disproportionate burden of cancer in the United States. Individuals with low socioeconomic status (SES) and who live in socially disadvantaged neighborhoods have higher rates of cancer incidence,<sup>1,2</sup> late-stage incidence,<sup>3,4</sup> and mortality,<sup>5,6</sup> and lower five-year survival<sup>2,7</sup> and cancer screening rates<sup>8–10</sup> than their higher SES counterparts and residents of stable, affluent neighborhoods. Cancer disparities also exist by race and ethnicity. African Americans are more likely than other groups to live in poverty, lack health insurance, be diagnosed with cancer at a later stage of disease, receive substandard cancer care once diagnosed, and have lower five-year survival rates and higher cancer mortality rates.<sup>11,12</sup> Compared with non-Hispanic Whites, African Americans, Hispanics/Latinos, and American Indian/Alaskan Natives are more likely to be diagnosed with cancer at later stages of disease.<sup>2</sup>

Health communication—including interpersonal communication, patient-provider interactions, entertainment-education, media advocacy, and new technologies—can help eliminate these disparities by increasing awareness of, and demand for, cancer prevention services and screening.<sup>13</sup> Used effectively, these strategies can increase the reach and effectiveness of health information to disadvantaged populations and help connect individuals to needed services.<sup>14</sup> Delivering such interventions through partnerships with social service agencies that reach low-income Americans is a promising strategy.<sup>15</sup> The *Federal Collaboration on Health Disparities Research* recommends working with service agencies in dissemination efforts.<sup>16</sup> One potential partner is 2-1-1, a telephone information and referral system that serves millions of Americans living in poverty and has well-established processes and infrastructure for assessing their needs and delivering referrals to community resources.

2-1-1 is a nationally-designated three-digit telephone exchange, like 9-1-1 (for emergencies) and 4-1-1 (for information about telephone numbers). Callers speak to a live information and referral specialist who identifies their needs, searches a computer database to find local resources, and provides referrals to those resources. Most 2-1-1 systems are funded through partnerships between a local United Way agency, other agencies, foundations, and/or government sources. In 2009 these call centers answered more than 16.2 million calls.<sup>17</sup> As of March 2011, there were 2-1-1 call centers available to 83% of the U.S. population (over 250 million Americans) in 49 states (including 34 states with greater than 90% coverage), Washington, D.C., and Puerto Rico. Callers to 2-1-1 are predominantly women, unemployed, low-income, and (where race or ethnicity is reported) disproportionately Black or Hispanic relative to the local population.<sup>15</sup> Most callers seek help meeting basic needs such as paying for food, shelter, heating and cooling, or seeking employment. Callers learn about the 2-1-1 service through 2-1-1's marketing efforts, word-of-mouth from interpersonal sources and other social service agencies, and in some cases from calling established telephone hotlines such as United Way's helplines or aging helplines that have been integrated into the three-digit 2-1-1 exchange. Because a large proportion of 2-1-1 callers are from the same underserved communities that are experiencing the greatest burden of cancer, 2-1-1 systems may be valuable partners for delivering cancer communication interventions. The national scope of the 2-1-1 delivery system also has the potential to greatly increase the reach of cancer control and prevention messages.

Most of what is published on the 2-1-1 system is found in the so-called gray literature rather than in peer-reviewed scientific journals. The existing literature includes cost-benefit analyses,<sup>18-20</sup> business plans and reports, (e.g., the 2-1-1 National Business Plan<sup>21</sup> and 2-1-1 Alameda County Monthly Narrative Report<sup>22</sup>), descriptions of the use of 2-1-1 in disaster management,<sup>23,24</sup> and a pilot study examining integration of cancer control referrals into 2-1-1 systems.<sup>15</sup> The benefits of 2-1-1 include cost savings to states and localities (e.g., fewer resources spent on calls for services not provided), to callers (e.g., diagnosis of, and help accessing, basic needs), and to taxpayers (e.g., less use of 9-1-1 for non-emergencies). Additionally, 2-1-1 helps with volunteer placement, providing a cost savings to non-profit organizations. 2-1-1 also streamlines disaster management, serving as an information line as well as enrolling disaster victims into assistance programs. Finally, 2-1-1 can assist local and state legislators in understanding the most pressing needs of their communities by developing reports on the most frequently encountered needs over a specified timeframe. (See <http://www.211us.org/benefits.htm> for an expanded listing of 2-1-1 reports and activities.)

To explore the potential of 2-1-1 systems as partners in efforts to eliminate cancer disparities, the Cancer Prevention and Control Research Network (CPCRN; <http://cpcrn.org>) formed a working group to collaborate with local 2-1-1 systems and assess callers' cancer control needs. The CPCRN is comprised of 10 U.S. university-based research centers conducting community-based, participatory research focused on translating evidence-based cancer control into practice and eliminating health disparities.<sup>25</sup> The CDC created and supports the CPCRN through its Prevention Research Centers program. The CPCRN formed a 2-1-1 working group to develop the partnership based on findings from the 2-1-1 pilot study conducted by one of its members.<sup>15</sup> Working group members worked with 2-1-1 systems in Missouri, North Carolina, Texas and Washington to administer a caller survey. Each partnership between working group members and their respective 2-1-1 was at least partially unique. For example, in Missouri, where an ongoing relationship had been established well before the current study, data were collected as part of a pilot for a larger trial to integrate cancer control and preventive care into 2-1-1. In Washington, by contrast, this collaboration was the first time 2-1-1 had worked with its research partners. The King County 2-1-1 system was compensated \$5,000 to cover the cost of training, integrating the system into its existing database, and administering the survey. Similar arrangements were made in North Carolina and Texas.

The survey assessed six cancer-related behaviors: smoking, smoke-free home policies, HPV vaccination, and screening for breast, cervical and colorectal cancer. The study objectives were to: 1) estimate the need for cancer control services in a population of 2-1-1 callers; 2) compare these needs to state and national cancer surveillance data to determine the extent to which 2-1-1 callers may have disparate needs, and 3) explore the feasibility of research and intervention partnerships with 2-1-1 systems, particularly receptiveness of callers to needed referrals.

## Methods

This study was approved by the Institutional Review Boards of Washington University in St. Louis, the University of North Carolina at Chapel Hill, the University of Texas Health Science Center at Houston, and the University of Washington.

**Study settings.** United Way 2-1-1 Missouri serves 99 of 114 counties in the state, excluding 15 counties in the greater Kansas City area that are served by another 2-1-1 system. In North Carolina, the 2-1-1 Centralized Call Center serves 44 of 100 counties, covering approximately 70% of the state's population. 2-1-1 Texas/United Way Helpline serves Houston and 12 surrounding counties. King County 2-1-1 serves the city of Seattle and its surrounding county.

**Study protocol.** Because each partnership between a 2-1-1 system and a CPRN member institution was established independently and each had unique requirements, there were slight variations in the research protocol across study settings. These are summarized in Table 1 and described in the sections that follow. Neither the survey items nor method of administration varied across study settings.

**Standard 2-1-1 service.** Callers to 2-1-1 are assisted by trained *information and referral (I&R) specialists*. If all I&R specialists are engaged with other callers, the first available specialist answers the call that has been in queue longest. If two or more specialists are available when a new call enters the queue, the specialist who has been idle the longest answers the call. This system was engineered to be random. It distributes calls evenly among the specialists on any given shift and is random in pairing any

**Table 1.**

### RESEARCH PROTOCOL ACROSS STUDY SITES 2009–2010

Study protocol	MO	NC	TX	WA
		Oct 2009– Jan 2010	Sept–Oct 2009	Dec 2009– Jan 2010
Survey accrual dates	Mar 2010			
Survey administration				
Specially trained information specialists	✓	✓	✓	✓
All information specialists on staff		✓		✓
Only selected information specialists	✓		✓	
Eligibility/exclusion criteria and tracking				
Age 18 and older	✓	✓	✓	✓
English speaking only	✓	✓		✓
No acute emotional distress or crisis	✓	✓	✓	✓
Not calling on behalf of someone else	✓	✓	✓	
Obtaining consent				
Verbal consent	✓	✓	✓	✓
Cancer control referrals				
Tracked caller acceptance of referrals	✓	✓	✓	

caller with any I&R specialist. This feature ensures that any information specialist at 2-1-1—including those administering the cancer risk assessment—is interacting with a random sample of callers. This means we can be confident that the sample of callers offered participation in the study was randomly selected from the universe of 2-1-1 callers during the project period.

Specialists greet the caller, ask their general location and ZIP code, and determine the reason for their call. I&R specialists also determine the gender, age, and in some cases, language preference of callers. All of these data are entered into a computerized phone and database system. The specialist then queries a referral database to find agencies located near the caller that might address his or her need. Matching results from each query appear onscreen, and the specialist provides this information to the caller.

**Participant recruitment.** After providing standard 2-1-1 service, I&R specialists offer callers the opportunity to participate in a health survey. In Missouri, two full-time specialists were dedicated to the study and offered study participation on every eligible call they received. In North Carolina, all I&R specialists were trained to recruit participants and administer surveys, but did this only when there were no calls waiting in queue. In Texas, 10 I&R specialists were trained to recruit participants and administer surveys. In Washington 23 I&R specialists recruited participants and administered surveys. No incentives were offered for participation.

**Eligibility criteria.** At all study sites, callers were required to be age 18 or older to participate. English-speaking callers were eligible at all sites, but Spanish-speaking callers were only eligible in Texas. Callers expressing emotional distress and those in crisis were not offered the opportunity to participate. Those calling 2-1-1 on behalf of someone else were not offered the opportunity to participate, except in Washington.

**Survey administration.** Trained 2-1-1 I&R specialists obtained consent over the telephone from all participants and administered the survey by phone using an online program. Participant responses were entered directly into the database. Participants' age and sex determined which survey questions they were asked (Table 2). Surveys were completed between September 2009 and March 2010.

**Measures.** The survey used items from the U.S. Behavioral Risk Factor Surveillance System.<sup>26</sup> These items assessed history of breast cancer screening, colorectal cancer screening, cervical cancer screening, HPV vaccination for eligible women and female children in the household, smoking status, and smoke-free home rules. Items from the BRFSS have established reliability and validity in diverse population samples.<sup>27,28</sup>

**Referral to cancer control resources.** Consistent with standard 2-1-1 service, every participant whose answers to the survey questions indicated a cancer control need is offered an appropriate referral. The offer of an appropriate referral consisted of a) restatement of the person's need for the referral (e.g., "You said you've never had a mammogram"), b) a sentence or two of health education about why the referral was important (e.g., "Once you turn 40, getting a mammogram every one to two years is the best way to fight breast cancer. Mammograms can find breast cancer early when it's easier to treat and cure"), c) a brief summary of the referral program and what it provided (e.g., "There's a good chance you can get a free mammogram through a program we have here in Missouri called 'Show Me Healthy Women'"), and d) a direct offer of the phone number to participants (i.e., "Would you like the phone number



**Table 2.****CANCER RISK ASSESSMENT ITEM ADMINISTRATION  
BY GENDER AND AGE 2009–2010**

Gender and age	Pap test	Mamm <sup>a</sup>	HPV <sup>b</sup> (self)	HPV <sup>c</sup> (child)	Colon <sup>d</sup>	Smoking <sup>e</sup>	Smoke- free <sup>f</sup>
Women, 18–26	√		√	√		√	√
Women, 27–39	√			√		√	√
Women, 40–49	√	√		√		√	√
Women, 50+	√	√		√	√	√	√
Men, <50				√		√	√
Men, 50+				√	√	√	√

<sup>a</sup>Mamm. = mammography<sup>b</sup>HPV (self) = HPV vaccination for an eligible woman<sup>c</sup>HPV vaccination (child) = parent's report of HPV vaccination for eligible female child in the home<sup>d</sup>Colon = colonoscopy<sup>e</sup>Smoking = current smoking status<sup>f</sup>Smoke-free = smoke-free home rules

for this program?”). If the participant responds in the affirmative, the phone number is provided and the referral is recorded as being accepted; otherwise the referral is recorded as refused. Like other 2-1-1 referrals, these cancer control referrals are based upon the caller's ZIP code and include telephone number, address, hours of operation, and in some cases, web sites for service providers. In Missouri, North Carolina and Texas (but not Washington due to difficulties in integrating this assessment into the King County 2-1-1 system database), I&R specialists record whether or not each cancer control referral is accepted (i.e., participant agrees to receive information about the referral service).

**Participation rates.** United Way 2-1-1 Missouri completed 320 surveys out of 914 callers (35% participation rate) over a period of one month in 2010, 2-1-1 Texas/United Way Helpline completed 374 surveys out of 781 callers (48%) over a period of two months in 2009, and King County 2-1-1 completed 361\* surveys out of 938 callers (38%) over a period of two months spanning late 2009 and early 2010. North Carolina had 344 completed surveys out of 10,241 total callers (3%) over a four-month period in 2009. The lower participation rate in North Carolina was primarily due to the practice of only inviting callers to participate in the study when no other calls were waiting in the queue. When considering the total number of callers who were eligible for participation in North Carolina, the rate of completed surveys was 20% (344 surveys

\*The Institutional Review Board at the University of Washington approved an enrollment of 300 participants, but 361 participants were ultimately enrolled from King County 2-1-1.

out of 1,750 eligible callers). The lower rate of completion among all callers in North Carolina greatly attenuated the pooled rate of survey completion across sites (11%).

**Analyses.** Descriptive statistics are provided for demographic variables. Pearson's chi-squared tests were performed for comparisons among 2-1-1 sites, states, and the U.S. population. Because the majority of callers were women and there are notable gender differences in health behaviors, prevalence data for each cancer control need was standardized to state-specific and national populations from the U.S. Census 2000. Direct standardization was based on the age and gender strata that determined which survey questions each participant received. Each 2-1-1 site's prevalence was standardized using its state population, while the pooled prevalence was standardized using the national population. Standardized estimates from 2-1-1 sites were compared with weighted frequencies and percentages from BRFSS 2008 data,<sup>29</sup> the most recent available BRFSS data at the time of analysis. All analyses were performed using STATA 10 (StatCorp, STATA 10.1. College Station, TX: StataCorp, 2008).

In addition to prevalence comparisons, a cancer control need score (i.e., the number of relevant behaviors present divided by the maximum possible behaviors) was calculated for each caller who participated in the survey. Cancer control need scores were calculated only if at least 67–80% of risk behaviors were not missing data. This ensured that at most only one item was missing from the total possible items used to calculate the cancer risk score.

Finally, we calculated the proportion of individuals with cancer control needs who accepted referrals (for Missouri, North Carolina, and Texas only).

## Results

**Participant characteristics.** Table 3 presents descriptive characteristics of the sample in aggregate and by study site. These characteristics differed significantly across study sites. The Texas sample had fewer men and callers with children under 18 in the home; callers in the Missouri sample were somewhat less likely to have female children under 18; and rates of uninsured callers were higher in Texas and Missouri than in Washington and North Carolina.

**Need for cancer control services.** Table 4 provides an overall summary of the study, including total callers, eligibility, cancer control needs and referral acceptance across all four states and for each state individually. Nearly 70% (69.4%) of the pooled sample had at least one cancer control need, 39.3% had at least two cancer control needs, and 15.9% had three or more needs.

Table 5 provides unstandardized estimates of cancer control needs and health insurance status in the pooled sample and presents a comparison of standardized rates to national rates for the U.S. from the BRFSS. Callers to 2-1-1 from the four sites combined were significantly ( $p<.0001$ ) less likely to have health insurance, a smoke-free home policy, ever had colonoscopy, and be up-to-date on mammography and Pap testing compared with the U.S. population. They also were significantly more likely to be current smokers. The rate of HPV vaccination was higher in the pooled sample than the U.S. rate; however, the difference was small compared with other needs. There were no state or national data available for comparing rates of HPV vaccination reported

**Table 3.****DESCRIPTIVE CHARACTERISTICS OF SAMPLE IN MISSOURI, NORTH CAROLINA, TEXAS, AND WASHINGTON (N=1408), 2009–2010**

Variables, %	MO	NC	TX	WA	All, %	p <sup>a</sup>
<b>n</b>	<b>320</b>	<b>352</b>	<b>375</b>	<b>361</b>	<b>1408</b>	
Age						.13
18–26	18.4	21.4	20.2	18.3	19.6	
27–39	31.9	26.9	36.1	32.7	31.9	
40–49	21.6	28.0	21.0	26.0	24.2	
50+	28.1	23.7	22.7	23.0	24.3	
Gender						<.0001
Male	19.7	21.0	8.8	25.8	18.7	
Female	80.3	79.0	91.2	74.2	81.3	
Have a child (<18) at home						<.0001
No	45.7	59.1	35.3	47.6	46.9	
Yes	54.3	40.9	64.4	52.4	53.1	
Refused	0	0	0.3	0	0.1	
Have a female child (<18) at home						<.05
No	70.4	58.7	55.2	64.3	61.8	
Yes	29.6	41.3	44.8	35.7	38.2	
Insured						<.0001
Yes	61.4	70.1	55.9	67.7	64.0	
No	38.2	27.8	43.2	29.1	34.3	
Don't know/not sure	0.3	0.6	0	3.1	1.1	
Refused	0	1.5	0.9	0	0.6	

<sup>a</sup>All p-values refer to Chi-square tests comparing states, excluding the responses don't know/not sure and refused.

for girls ages 9 to 17 years in the 2-1-1 sample. Comparisons of each 2-1-1 system to the state-specific data revealed similar results (Table 6).

**Accepting referrals for cancer control services.** In Missouri, North Carolina, and Texas, mammography referrals were accepted by 71.8% of those needing them. Of those in need of HPV vaccination for themselves, 69.6% accepted referrals, and 60.2% of callers in need of a Pap test accepted referrals for this service. Fifty-five percent (55.0%) of callers who were current smokers accepted smoking cessation referrals, as did 53.4% of callers with a child in need of HPV vaccination. Colorectal cancer screening referrals were accepted by 38.6% of those in need of them. Finally, 32.9% of callers in need of smoke-free homes referrals accepted them.

**Table 4.**  
**STUDY SUMMARY (TOTAL CALLERS, ELIGIBLE CALLERS,**  
**COMPLETED SURVEYS, CANCER CONTROL NEEDS,**  
**AND ACCEPTED REFERRALS)**

	Pooled (4 states)	2-1-1 MO	2-1-1 NC	2-1-1 TX	2-1-1 WA
Total number of callers (n)	12874	914	10,241	781	938
Eligible, %	N/A	67.8	17.1	N/A	N/A
Eligible who completed survey, %	N/A	51.2	19.7	N/A	N/A
Completed survey of all callers, %	10.9	35.0	3.4	47.9	38.5
Any cancer control need, % <sup>a</sup>	69.4	78.3	67.1	67.1	65.1
Accepted referral, % <sup>b</sup>					
Smoking cessation	55.0	71.8	35.2	49.3	N/A
Smoke-free home	32.9	48.6	17.1	26.9	N/A
Colorectal cancer screening	38.6	67.3	0	38.3	N/A
HPV vaccination (self)	69.6	64.3	53.6	85.7	N/A
HPV vaccination (daughter)	53.4	69.7	56.5	43.5	N/A
Mammography	71.8	98.0	61.4	62.2	N/A
Pap test	60.2	82.8	33.3	65.1	N/A

<sup>a</sup>Proportion with at least 1 cancer control need. Cancer control need scores calculated if at least 67–80% of risk behaviors were not missing data.

<sup>b</sup>Proportion accepting referrals of those with cancer control needs.

N/A = Not Available

**Discussion**

Clearly, 2-1-1 systems are reaching Americans with significant unmet health needs. A majority of callers needed at least one cancer control service, and nearly 40% needed at least two services. Compared with state and national rates, 2-1-1 callers in Missouri, North Carolina, Texas, and Washington had higher rates of smoking and lower rates of using evidence-based cancer control services. Callers were also much more likely to be uninsured, a factor consistently associated with underutilization of cancer control services.<sup>30,31</sup> This study suggests that callers are willing to answer questions about their health and to receive referrals for needed preventive health services. Callers were particularly receptive to referrals for mammography, adult HPV vaccination, and Pap testing, with approximately 60–72% of callers who needed these services accepting a referral. No fewer than a third of those in need accepted referrals overall, suggesting potential for effective intervention in a number of areas for cancer prevention and control.

These findings reinforce numerous previous reports showing an elevated cancer risk profile for low-income and underserved populations.<sup>2,8–10,32</sup> The difference in this study is that the 2-1-1 data not only delineate the problem, but also point to a potential solution.

**Table 5.**  
**UNSTANDARDIZED AND STANDARDIZED ESTIMATES OF CANCER CONTROL NEEDS**  
**IN UNITED WAY 2-1-1 CALLERS (4 STATES POOLED) VS. U.S. 2009–2010**

Cancer Control Need	2-1-1 Respondents (n)	2-1-1, %	2-1-1 <sup>a</sup> , %	BRFSS U.S., %	p-value
No health insurance	All (n = 1408)	34.9	37.2	15.2	<.0001
Current cigarette smoker	All (n = 1408)	28.7	33.2	18.4	<.0001
Has smoke-free policy	All (n = 1408)	70.9	69.4	76.4	<.0001
Ever had a colonoscopy	Men and women, 50+ (n = 337)	47.9	50.2	61.4	<.0001
Received HPV vaccination (self) <sup>b</sup>	Women, 18–26 (n = 229)	19.4	19.4	18.4	<.0001
Received HPV vaccination (daughter)	Have daughters 9–17 (n = 271)	39.2	35.9	N/A	
Up-to-date on mammography <sup>c</sup>	Women, 40+ (n = 529)	55.6	56.5	76.3	<.0001
Up-to-date on Pap test <sup>d</sup>	Women, 18+ (n = 1128)	78.0	75.7	78.0	<.0001

N/A = Not Available

<sup>a</sup>Standardized by age and gender strata for the United States population.

<sup>b</sup>Unstandardized because of only one age stratum for women.

<sup>c</sup>Within last 2 years

<sup>d</sup>Within last 3 years

Table 6.

UNSTANDARDIZED AND STANDARDIZED ESTIMATES OF CANCER CONTROL NEEDS  
IN 2-1-1 SITES VS. STATE-SPECIFIC BRFSS VS. BRFSS U.S. 2009–2010

United Way 2-1-1 Missouri						
Risk factor/ preventive measure	2-1-1 Respondents (n)	2-1-1 MO, %	2-1-1 MO <sup>a</sup> , %	BRFSS MO, %	BRFSS U.S., %	
No health insurance	All (n=320)	38.4	42.3	14.5	15.2	
Current cigarette smoker	All (n=320)	40.9	42.4	24.9	18.4	
Has smoke-free policy	All (n=320)	53.3	52.3	N/A	76.4	
Ever had a colonoscopy	Men and women, 50+ (n=90)	47.8	50.3	61.1	61.4	
Received HPV vaccination (self) <sup>b</sup>	Women, 18–26 (n=57)	25.9	25.9	N/A	18.4	
Received HPV vaccination (daughter)	Have daughters, 9–17 (n=50)	40.0	34.1	N/A	N/A	
Up-to-date on mammography <sup>c</sup>	Women, 40+ (n=117)	56.5	57.1	73.0	76.3	
Up-to-date on Pap test <sup>d</sup>	Women, 18+ (n=257)	76.8	75.0	76.7	78.0	
North Carolina (NC) Centralized Call Center 2-1-1						
Risk factor/ preventive measure	2-1-1 Respondents (n)	2-1-1 NC, %	2-1-1 NC <sup>a</sup> , %	BRFSS NC, %	BRFSS U.S., %	
No health insurance	All (n=352)	28.4	28.4	17.8	15.2	
Current cigarette smoker	All (n=352)	25.9	29.3	20.8	18.4	
Has smoke-free policy	All (n=352)	69.9	69.3	76.8	76.4	
Ever had a colonoscopy	Men and women, 50+ (n=83)	61.5	59.8	66.0	61.4	
Received HPV vaccination (self) <sup>b</sup>	Women, 18–26 (n=52)	22.2	22.2	N/A	18.4	
Received HPV vaccination (daughter)	Have daughters, 9–17 (n=57)	42.5	31.5	N/A	N/A	
Up-to-date on mammography <sup>c</sup>	Women, 40+ (n=150)	62.4	63.1	77.7	76.3	
Up-to-date on Pap test <sup>d</sup>	Women, 18+ (n=276)	75.8	73.2	81.4	78.0	

(Continued on p. 763)

Table 6. (continued)

2-1-1 Texas/United Way Helpline					
Risk factor/ preventive measure	2-1-1 Respondents (n)	2-1-1 TX, %	2-1-1 TX <sup>a</sup> , %	BRFSS TX, %	BRFSS U.S., %
No health insurance	All (n=375)	43.6	39.9	25.6	15.2
Current cigarette smoker	All (n=375)	17.8	27.5	18.4	18.4
Has smoke-free policy	All (n=375)	79.6	71.1	N/A	76.4
Ever had a colonoscopy	Men and women, 50+ (n=81)	38.2	52.5	55.7	61.4
Received HPV vaccination (self) <sup>b</sup>	Women, 18–26 (n=70)	4.6	4.6	11.7	18.4
Received HPV vaccination (daughter)	Have daughters, 9–17 (n=99)	31.9	13.9	N/A	N/A
Up-to-date on mammography <sup>c</sup>	Women, 40+ (n=139)	45.6	47.6	72.4	76.3
Up-to-date on Pap test <sup>d</sup>	Women, 18+ (n=327)	80.4	78.1	77.3	78.0

United Way King County (WA) 2-1-1					
Risk factor/ preventive measure	2-1-1 Respondents (n)	2-1-1 WA, %	2-1-1 WA <sup>a</sup> , %	BRFSS WA, %	BRFSS U.S., %
No health insurance	All (n=361)	30.1	35.3	13.3	15.2
Current cigarette smoker	All (n=361)	31.9	34.5	15.6	18.4
Has smoke-free policy	All (n=361)	79.5	80.0	N/A	76.4
Ever had a colonoscopy	Men and women, 50+ (n=83)	43.0	44.0	65.8	61.4
Received HPV vaccination (self) <sup>b</sup>	Women, 18–26 (n=50)	24.4	24.4	N/A	18.4
Received HPV vaccination (daughter)	Have daughters, 9–17 (n=65)	48.2	45.0	N/A	N/A
Up-to-date on mammography <sup>c</sup>	Women, 40+ (n=123)	57.6	55.5	75.8	76.3
Up-to-date on Pap test <sup>d</sup>	Women, 18+ (n=268)	78.4	75.2	75.6	78.0

All ps <.0001 for Pearson’s Chi-square analyses comparing standardized 2-1-1 estimates to weighted state and national BRFSS estimates, where comparison data were available.

<sup>a</sup>Standardized by age and gender strata for state population.

<sup>b</sup>Unstandardized because of only one age stratum for women.

<sup>c</sup>Within last 2 years

<sup>d</sup>Within last 3 years

BRFS = Behavioral Risk Factor Surveillance

N/A = Not Available

The challenges of reaching this population through traditional approaches are well-documented. For example, a 2008 review of 18 studies found that media campaigns to promote smoking cessation and use of telephone quitlines were commonly less effective in socially disadvantaged populations.<sup>33</sup> The 2-1-1 system provides a potentially more efficient alternative and is already in place in nearly every community in the U.S. 2-1-1 may be an especially promising channel both for identifying high-risk populations and delivering risk-reducing interventions. In particular, 2-1-1 appears to reach Americans with a heightened need for mammography, tobacco cessation, and colonoscopy.

Opportunities also exist for health interventions with 2-1-1 callers that go beyond a traditional information and referral model. For example, using tailored print materials along with telephone referrals,<sup>34–37</sup> proactive counseling with multiple contacts,<sup>38</sup> and navigation for underserved populations<sup>39</sup> are all empirically-supported interventions that could be delivered through 2-1-1 systems, and are currently being tested in Missouri and Texas. Preliminary and ongoing research in Missouri has demonstrated the feasibility of integrating proactive screening for control needs and referrals to cancer control services into a 2-1-1 system. Pilot studies have found that 2-1-1 callers are willing to answer questions about their health, are receptive to health referrals delivered by phone and by mail, remember the referrals, and feel that including health referrals makes 2-1-1 more appealing.<sup>15</sup> More importantly, 25–30% of pilot study participants made use of the cancer control referrals within three weeks of receiving them. An ongoing randomized, controlled trial is testing the relative efficacy of referrals, tailored print materials, and telephone-based navigation with callers from the United Way 2-1-1 Missouri system. Similar research modeled on the Missouri approach is underway in Texas, with an emphasis on the use of cancer control navigators.

2-1-1 interventions can have significant public health impact given the large number of individuals served. Applying the prevalence estimates found in this study to the estimated 16 million calls to 2-1-1 systems nationally in 2009,<sup>17</sup> interventions could reach 5 million smokers, 3.1 million women in need of Pap tests, 2.6 million women needing mammograms, 2.3 million women needing HPV vaccination for themselves, 1.9 million needing HPV vaccination for their daughters, and 1.9 million callers in need of colonoscopies. Even reducing these numbers by 20–30% to account for repeat callers does little to diminish the potential impact on population health and health disparities.

**Limitations.** The study sample may or may not be representative of all callers to the 2-1-1 systems that were included. Callers participating in the study may have had greater cancer risks than those who refused, though this is unlikely based on previous research.<sup>28,40</sup> Participation rates varied by study site, in part as a function of minor differences in methodology, but also because of a strong commitment by 2-1-1 not to compromise their standard services. While we cannot generalize our findings to all other 2-1-1 systems, we do note the relative comparability of findings for each study site. Future research designed to include a nationally representative sample of callers to 2-1-1 would provide a valuable comparison for these results. The quantitative survey design of the present study limits our understanding of why callers were willing to participate and how the social service needs that prompt their calls are related to their health needs. The current trial in Missouri will be able to answer these questions with both quantitative and qualitative data from 2-1-1 callers.



**Conclusion.** The majority of 2-1-1 callers has one or more cancer control needs and is eligible for community-based services to address these needs. Given its wide reach, unique expertise, and considerable experience working with this population, 2-1-1 has the potential to be a key player in eliminating health disparities. The leadership and staff of many 2-1-1 systems are capable, willing, and enthusiastic partners in health research and referral to health services. Their high level of professionalism and openness to collaboration not only made this study possible, but also bode well for future partnerships aimed at reducing health disparities. Nationally, the 2-1-1 system holds great promise for delivering cancer communication interventions designed to reduce, and ultimately eliminate, cancer disparities disfavoring low-income and racial and ethnic minority populations.

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